



SEQUENCE LISTING

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Weisbeek, Petrus

<120> Production of Oligosaccharides in Transgenic Plants

<130> AFNO-1-15313

<140> US 09/543,861

<141> 2000-03-24

<150> US 09/019,385

<151> 1998-02-05

<150> US 08/479,470

<151> 1995-06-07

<150> NL 1000064

<151> 1995-04-05

<150> NL 9401140

<151> 1994-03-07

<160> 12

<170> PatentIn version 3.0

<210> 1

<211> 2094

<212> DNA

<213> Barley

<220>

<221> CDS

<222> (46)..(1923)

<400> 1

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57

Met Gly Ser His

1

ggc aag cca ccg cta ccg tac gcc tac aag ccg ctg ccc tgg gac gcc

105
 Gly Lys Pro Pro Leu Pro Tyr Ala Tyr Lys Pro Leu Pro Ser Asp Ala
 5 10 15 20
 gcc gac ggt aag cgg acc ggc tgc atg agg tgg tcc gcg tgt gcc acc
 153
 Ala Asp Gly Lys Arg Thr Gly Cys Met Arg Trp Ser Ala Cys Ala Thr
 25 30 35
 gtg ctg acg gcc tgc gcc atg gcg gtg gtg gtg gtc ggc gcc acg ctc
 201
 Val Leu Thr Ala Ser Ala Met Ala Val Val Val Val Gly Ala Thr Leu
 40 45 50
 ctg gcg gga ttg agg atg gag cag gcc gtc gac gag gag gcg gcg gcg
 249
 Leu Ala Gly Leu Arg Met Glu Gln Ala Val Asp Glu Glu Ala Ala Ala
 55 60 65
 ggc ggg ttc ccg tgg agc aac gag atg ctg cag tgg cag cgc agc ggt
 297
 Gly Gly Phe Pro Trp Ser Asn Glu Met Leu Gln Trp Gln Arg Ser Gly
 70 75 80
 tac cat ttc cag acg gcc aag aac tac atg agc gat ccc aac ggc ctg
 345
 Tyr His Phe Gln Thr Ala Lys Asn Tyr Met Ser Asp Pro Asn Gly Leu
 85 90 95 100
 atg tat tac cgt gga tgg tac cac atg ttc tac cag tac aac ccg gtg
 393
 Met Tyr Tyr Arg Gly Trp Tyr His Met Phe Tyr Gln Tyr Asn Pro Val
 105 110 115

ggc acc gac tgg gac gac ggc atg gag tgg ggc cac gcc gtg tcc cgg
441

Gly Thr Asp Trp Asp Asp Gly Met Glu Trp Gly His Ala Val Ser Arg

120

125

130

aac ctt gtc caa tgg cgc acc ctc cct atc gcc atg gtg gcc gac cag
489

Asn Leu Val Gln Trp Arg Thr Leu Pro Ile Ala Met Val Ala Asp Gln

135

140

145

tgg tac gac atc ctc gga gtc ctc tgg ggc tcc atg acg gtg cta ccc
537

Trp Tyr Asp Ile Leu Gly Val Leu Ser Gly Ser Met Thr Val Leu Pro

150

155

160

aac ggg acg gtc atc atg atc tac acg ggc gcc acc aac gcc tcc gcc
585

Asn Gly Thr Val Ile Met Ile Tyr Thr Gly Ala Thr Asn Ala Ser Ala

165

170

175

180

gtg gag gtc cag tgc atc gcc acc ccg gcc gac ccc aac gac ccc ctc
633

Val Glu Val Gln Cys Ile Ala Thr Pro Ala Asp Pro Asn Asp Pro Leu

185

190

195

ctc cgc cgg tgg acc aag cac ccc gcc aac ccc gtc atc tgg tgg ccg
681

Leu Arg Arg Trp Thr Lys His Pro Ala Asn Pro Val Ile Trp Ser Pro

200

205

210

ccg ggg gtc ggc acc aag gat ttc cga gac ccg atg acc gcc tgg tac
729

Pro Gly Val Gly Thr Lys Asp Phe Arg Asp Pro Met Thr Ala Trp Tyr

215

220

225

gac gag tcc gac gag aca tgg cgc acc ctc ctc ggg tcc aag gac gac
777

Asp Glu Ser Asp Glu Thr Trp Arg Thr Leu Leu Gly Ser Lys Asp Asp

230

235

240

cac gac ggc cac cac gac ggc atc gcc atg atg tac aag acc aag gac
825

His Asp Gly His His Asp Gly Ile Ala Met Met Tyr Lys Thr Lys Asp

245

250

255

260

ttc ctc aac tac gag ctc atc ccg ggc atc ttg cac cgg gtg gtg cgc
873

Phe Leu Asn Tyr Glu Leu Ile Pro Gly Ile Leu His Arg Val Val Arg

265

270

275

acc ggc gag tgg gag tgc atc gac ttc tac ccc gtc ggc cgg aga agc
921

Thr Gly Glu Trp Glu Cys Ile Asp Phe Tyr Pro Val Gly Arg Arg Ser

280

285

290

agc gac aac tcg tcg gag atg ctg cac gtg ttg aag gcg agc atg gac
969

Ser Asp Asn Ser Ser Glu Met Leu His Val Leu Lys Ala Ser Met Asp

295

300

305

gac gaa cgg cac gac tac tac tcg ctg ggc acg tac gac tcg gcg gcc
1017

Asp Glu Arg His Asp Tyr Tyr Ser Leu Gly Thr Tyr Asp Ser Ala Ala

310

315

320

aac acg tgg acg ccc atc gac ccg gag ctc gac ttg ggg atc ggg ctg
1065

Asn Thr Trp Thr Pro Ile Asp Pro Glu Leu Asp Leu Gly Ile Gly Leu

325

330

335

340

aga tac gac tgg gga aag ttt tat gcg tcc acc tcc ttc tat gat ccg
1113

Arg Tyr Asp Trp Gly Lys Phe Tyr Ala Ser Thr Ser Phe Tyr Asp Pro

345

350

355

gcc aag aac cgg cgc gtg ctc atg ggg tac gtc ggc gag gtc gac tcc
1161

Ala Lys Asn Arg Arg Val Leu Met Gly Tyr Val Gly Glu Val Asp Ser

360

365

370

aag cgg gct gat gtc gtc aag gga tgg gct tcc att cag tca gtt cct
1209

Lys Arg Ala Asp Val Val Lys Gly Trp Ala Ser Ile Gln Ser Val Pro

375

380

385

agg acg gtg gct ctg gat gag aag acc cgg acg aac ctc ctg ctc tgg
1257

Arg Thr Val Ala Leu Asp Glu Lys Thr Arg Thr Asn Leu Leu Leu Trp

390

395

400

ccc gtt gag gag atc gag acc ctc cgc ctc aat gcc acg gaa ctg acc
1305

Pro Val Glu Glu Ile Glu Thr Leu Arg Leu Asn Ala Thr Glu Leu Thr

405

410

415

420

gac gtt acc att aac act ggc tcc gtc atc cat atc ccg ctc cgc caa
1353

Asp Val Thr Ile Asn Thr Gly Ser Val Ile His Ile Pro Leu Arg Gln

425

430

435

ggc act cac gct cga cat gcg gag gcc tct ttc cac ctt gat gct tcc
1401

Gly Thr His Ala Arg His Ala Glu Ala Ser Phe His Leu Asp Ala Ser

440	445	450	
gcc gtg gct gcc ctc aac gag gcc gat gtg ggc tac aac tgc agt agc 1449 Ala Val Ala Ala Leu Asn Glu Ala Asp Val Gly Tyr Asn Cys Ser Ser			
455	460	465	
agc ggc ggc gct gtt aac cgc ggc gcg cta ggc ccc ttc ggc ctc ctc 1497 Ser Gly Gly Ala Val Asn Arg Gly Ala Leu Gly Pro Phe Gly Leu Leu			
470	475	480	
gtc ctc gcc gcc ggt gac cgc cgt ggc gag caa acg gcg gtc tac ttc 1545 Val Leu Ala Ala Gly Asp Arg Arg Gly Glu Gln Thr Ala Val Tyr Phe			
485	490	495	500
tac gtg tot agg ggc ctt gac gga ggc ctc cac acc agc ttc tgc caa 1593 Tyr Val Ser Arg Gly Leu Asp Gly Gly Leu His Thr Ser Phe Cys Gln			
505	510	515	
gat gag ctg aga tcg tca cga gcc aag gat gtg acc aag cgt gtc atc 1641 Asp Glu Leu Arg Ser Ser Arg Ala Lys Asp Val Thr Lys Arg Val Ile			
520	525	530	
ggg agc acg gtg ccg gtg ctc gac ggt gag gct ttg tca atg agg gtg 1689 Gly Ser Thr Val Pro Val Leu Asp Gly Glu Ala Leu Ser Met Arg Val			
535	540	545	
ctc gtg gat cac tcc atc gtg cag gcc ttc gac atg gcc ggg agg acc 1737 Leu Val Asp His Ser Ile Val Gln Gly Phe Asp Met Gly Gly Arg Thr			

550 555 560
 acg atg acc tcg cgg gtg tac ccg atg gag tcg tat cag gag gca aga
 1735
 Thr Met Thr Ser Arg Val Tyr Pro Met Glu Ser Tyr Gln Glu Ala Arg
 565 570 575 580
 gtc tac ttg ttc aac aac gcc acc ggt gcc agc gtg acg gcg gaa agg
 1833
 Val Tyr Leu Phe Asn Asn Ala Thr Gly Ala Ser Val Thr Ala Glu Arg
 585 590 595
 ctg gtc gtg cac gag atg gac tcg gca cac aac cag ctc tcc aat gag
 1881
 Leu Val Val His Glu Met Asp Ser Ala His Asn Gln Leu Ser Asn Glu
 600 605 610
 gac gat ggc atg tat ctt cat caa gtt ctt gaa tct cgt cat
 1923
 Asp Asp Gly Met Tyr Leu His Gln Val Leu Glu Ser Arg His
 615 620 625
 taataagcta cattggatca aagaagatca ccaggggaagg gcaattcata cataaatcga
 1983
 atcattctgc acaacctcgc ttgcagcatg cattgaaaca tctgtatttg gatcatcttc
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 2094
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 <211> 626
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 <213> Barley
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Met Gly Ser His Gly Lys Pro Pro Leu Pro Tyr Ala Tyr Lys Pro Leu
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Pro Ser Asp Ala Ala Asp Gly Lys Arg Thr Gly Cys Met Arg Trp Ser
20 25 30

Ala Cys Ala Thr Val Leu Thr Ala Ser Ala Met Ala Val Val Val
35 40 45

Gly Ala Thr Leu Leu Ala Gly Leu Arg Met Glu Gln Ala Val Asp Glu
50 55 60

Glu Ala Ala Ala Gly Gly Phe Pro Trp Ser Asn Glu Met Leu Gln Trp
65 70 75 80

Gln Arg Ser Gly Tyr His Phe Gln Thr Ala Lys Asn Tyr Met Ser Asp
85 90 95

Pro Asn Gly Leu Met Tyr Tyr Arg Gly Trp Tyr His Met Phe Tyr Gln
100 105 110

Tyr Asn Pro Val Gly Thr Asp Trp Asp Asp Gly Met Glu Trp Gly His
115 120 125

Ala Val Ser Arg Asn Leu Val Gln Trp Arg Thr Leu Pro Ile Ala Met
130 135 140

Val Ala Asp Gln Trp Tyr Asp Ile Leu Gly Val Leu Ser Gly Ser Met
145 150 155 160

Thr Val Leu Pro Asn Gly Thr Val Ile Met Ile Tyr Thr Gly Ala Thr
165 170 175

Asn Ala Ser Ala Val Glu Val Gln Cys Ile Ala Thr Pro Ala Asp Pro
180 185 190

Asn	Asp	Pro	Leu	Leu	Arg	Arg	Trp	Thr	Lys	His	Pro	Ala	Asn	Pro	Val
	195						200					205			
Ile	Trp	Ser	Pro	Pro	Gly	Val	Gly	Thr	Lys	Asp	Phe	Arg	Asp	Pro	Met
	210					215					220				
Thr	Ala	Trp	Tyr	Asp	Glu	Ser	Asp	Glu	Thr	Trp	Arg	Thr	Leu	Leu	Gly
225					230					235					240
Ser	Lys	Asp	Asp	His	Asp	Gly	His	His	Asp	Gly	Ile	Ala	Met	Met	Tyr
				245					250					255	
Lys	Thr	Lys	Asp	Phe	Leu	Asn	Tyr	Glu	Leu	Ile	Pro	Gly	Ile	Leu	His
			260					265					270		
Arg	Val	Val	Arg	Thr	Gly	Glu	Trp	Glu	Cys	Ile	Asp	Phe	Tyr	Pro	Val
		275					280					285			
Gly	Arg	Arg	Ser	Ser	Asp	Asn	Ser	Ser	Glu	Met	Leu	His	Val	Leu	Lys
	290					295					300				
Ala	Ser	Met	Asp	Asp	Glu	Arg	His	Asp	Tyr	Tyr	Ser	Leu	Gly	Thr	Tyr
305					310					315					320
Asp	Ser	Ala	Ala	Asn	Thr	Trp	Thr	Pro	Ile	Asp	Pro	Glu	Leu	Asp	Leu
				325					330					335	
Gly	Ile	Gly	Leu	Arg	Tyr	Asp	Trp	Gly	Lys	Phe	Tyr	Ala	Ser	Thr	Ser
			340					345					350		
Phe	Tyr	Asp	Pro	Ala	Lys	Asn	Arg	Arg	Val	Leu	Met	Gly	Tyr	Val	Gly
		355					360					365			
Glu	Val	Asp	Ser	Lys	Arg	Ala	Asp	Val	Val	Lys	Gly	Trp	Ala	Ser	Ile
	370					375					380				

Gln Ser Val Pro Arg Thr Val Ala Leu Asp Glu Lys Thr Arg Thr Asn
385 390 395 400

Leu Leu Leu Trp Pro Val Glu Glu Ile Glu Thr Leu Arg Leu Asn Ala
405 410 415

Thr Glu Leu Thr Asp Val Thr Ile Asn Thr Gly Ser Val Ile His Ile
420 425 430

Pro Leu Arg Gln Gly Thr His Ala Arg His Ala Glu Ala Ser Phe His
435 440 445

Leu Asp Ala Ser Ala Val Ala Ala Leu Asn Glu Ala Asp Val Gly Tyr
450 455 460

Asn Cys Ser Ser Ser Gly Gly Ala Val Asn Arg Gly Ala Leu Gly Pro
465 470 475 480

Phe Gly Leu Leu Val Leu Ala Ala Gly Asp Arg Arg Gly Glu Gln Thr
485 490 495

Ala Val Tyr Phe Tyr Val Ser Arg Gly Leu Asp Gly Gly Leu His Thr
500 505 510

Ser Phe Cys Gln Asp Glu Leu Arg Ser Ser Arg Ala Lys Asp Val Thr
515 520 525

Lys Arg Val Ile Gly Ser Thr Val Pro Val Leu Asp Gly Glu Ala Leu
530 535 540

Ser Met Arg Val Leu Val Asp His Ser Ile Val Gln Gly Phe Asp Met
545 550 555 560

Gly Gly Arg Thr Thr Met Thr Ser Arg Val Tyr Pro Met Glu Ser Tyr
565 570 575

Gln Glu Ala Arg Val Tyr Leu Phe Asn Asn Ala Thr Gly Ala Ser Val
 580 585 590

Thr Ala Glu Arg Leu Val Val His Glu Met Asp Ser Ala His Asn Gln
 595 600 605

Leu Ser Asn Glu Asp Asp Gly Met Tyr Leu His Gln Val Leu Glu Ser
 610 615 620

Arg His
 625

<210> 3
 <211> 30
 <212> DNA
 <213> Synthetic DNA

<400> 3
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 30

<210> 4
 <211> 36
 <212> DNA
 <213> Synthetic DNA

<400> 4
 cgcctgcagg taccacatgt tytaycarta yaaycc
 36

<210> 5
 <211> 35
 <212> DNA
 <213> Synthetic DNA

<400> 5
 ccacgtctag agctctcttc rtaccavgcc gtcac
 35

<210> 6

<211> 47
 <212> PRT
 <213> Peptide

<400> 6

His Phe Gln Thr Ala Lys Asn Tyr Met Ser Asp Pro Asn Gly Leu Met
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Tyr Tyr Arg Gly Trp Tyr His Met Phe Tyr Gln Tyr Asn Pro Val Gly
 20 25 30

Thr Asp Trp Asp Asp Gly Met Glu Trp Gly His Ala Val Ser Arg
 35 40 45

<210> 7
 <211> 11
 <212> PRT
 <213> Peptide

<400> 7

Trp Glu Cys Ile Asp Phe Tyr Pro Val Gly Arg
 1 5 10

<210> 8
 <211> 8
 <212> PRT
 <213> Peptide

<400> 8

Ser Gly Ser Met Thr Val Leu Pro
 1 5

<210> 9
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 <212> PRT
 <213> Peptide

<400> 9

Phe Arg Asp Pro Met Thr Ala Trp Tyr Asp
 1 5 10

<210> 10
 <211> 11
 <212> PRT

<213> Peptide

<400> 10

Asp Trp Gly Lys Phe Tyr Ala Ser Thr Ser Phe
1 5 10

<210> 11

<211> 13

<212> FRT

<213> Peptide

<220>

<221> misc_feature

<222> (1)..(13)

<223> Xaa is the nucleotide equivalent of any set containing "n"

<400> 11

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1 5 10

<210> 12

<211> 15

<212> FRT

<213> Peptide

<220>

<221> misc_feature

<222> (1)..(15)

<223> Xaa in position 11 is either phenylalanine or leucine

<400> 12

Ala Val Pro Val Xaa Leu Xaa Xaa Pro Leu Xaa Ile Xaa Trp Val
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